

INTRODUCTION

Bird migration is an intriguing as well as fascinating subject. It is intriguing because, several biochemical and physiological changes taking place in the body of the bird, before, during and after migration, have not been sufficiently understood so as to provide complete answers to all questions regarding migration. It is fascinating because the several changes taking place cover certain important life processes which when finally explained might well provide new solutions for old problems pertaining to the mysteries of life itself.

In the series of studies presented in this thesis, an attempt has been made to peep into the dark corners of the subjects of bird migration. It would be pretentious to claim that all the corners of this vast subject have been broken through. The author on the other hand has confined himself to only a few aspects which he thought was more helpful towards a better understanding of the subject. If that end is achieved and if these investigations have raised newer questions as indeed they have, than found solutions to the older ones, the author would deem himself highly rewarded.

It is well known that during the period before migration birds accumulate large amounts of fat in the body particularly in the fat bodies and liver (Odum and Connell, 1956). It is also known that birds utilize fat as fuel for muscular energy (George and Jyoti, 1955, 1957; George and Talesara, 1962) and that as muscle fat is depleted, fat from the liver (George and Jyoti, 1955)

and adipose tissue (George and Vallyathan, 1963)^a is transported to the muscle for utilization. It therefore becomes necessary to know more about the store of metabolites in these depots particularly, the liver of a migratory bird. The migratory starling, Sturnus (Pastor) roseus was chosen for the present studies. The seasonal variations in the storage of the different metabolites with special reference to fat, were studied (Chapter, 1). The problem of fat synthesis in the liver of the bird has now become a subject of considerable importance with the discovery of the haematopoietic nodules in the liver (Chapter, 2).

The increased fat deposition during the premigratory period is essentially the result of increased food intake stimulated by hyperphagia. The hyperphagia is accompanied by an increase in the insulin producing beta cells of the pancreas which is responsible for the diversion of the excess glucose for fat synthesis (Chapter, 3). For the increased muscular activity and in the utilization of fat during migration it is logical to expect a significant role of the thyroid in effecting in an elevation in katabolism (Chapter, 4).

These starlings leave Baroda to return to their breeding grounds abroad, towards the last week of April. The males leave first and about a week later the females follow. During the premigratory period the testes in males undergo rapid development. The cyclic histological changes in the testis have been studied (Chapter, 5).

There have been several views put forward regarding the

annual stimulus for migration. The influence of photoperiodicity on the neuroendocrine ³system inducing a triggering action has been well emphasized (Farner and Oksche, 1962). However, the role of the endocrines in such actions has not been well understood. With a view to bridge this gulf, the hypothalamo-hypophyseal neurosecretory system (Chapters, 6 & 8) in the Rosy Pastor has been studied in relation to simultaneous changes occurring in the pituitary (Chapter, 7) and adrenal (Chapters, 9, 10 & 11).

The physiology of the avian body undergoes dynamic changes in the process of preparing the bird for migration. These changes follow certain well specified patterns and are controlled by a mechanism of high precision. The phenomenon of migration therefore, is a multiphased one and for a further understanding of its complexity well planned and integrated studies on the various events and the factors controlling them are called for. The series of investigations presented in this thesis is a humble attempt in that direction.